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Study of Serum Magnesium in Critically Ill Patients.

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ABSTRACT

To study serum magnesium level in critically ill patients compared to healthy controls. To predict the correlation of magnesium level with patient's prognosis and outcome. Study is conducted in sree balaji medical college during febraury 2014 – june 2014. It includes a total of 100 patients, of which 50 are patients from medical intensive care unit and 50 are healthy controls. Blood is collected in plain tube, centrifuged and serum is separated. Serum magnesium level is estimated using colorimetric method. Serum calcium and serum albumin level was also estimated. Serum magnesium levels were found to be significantly low in critically ill patients (1.8 ±0.3 mmol/l) compared to healthy controls (2.2 ±0.2 mmol/l). Significant reduction of serum magnesium levels contributed to prolonged ICU stay, high mortality rate with poor prognosis.

Keywords: serum magnesium, critically ill patients, prognosis

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INTRODUCTION

Magnesium is the second most abundant intracellula cation. Although magnsesium was a "forgotten ion" previously,it has gained importance in the recent trends due to its deficiency in critical care units. Magnesium is a cofactor for ATP production and thus fundamental to all biological processes within the body. Hypomagnesemia is a common finding in current medical practice, mainly in critically ill and postoperative patients. Upon admission to the intensive care unit (ICU), the prevalence of this electrolyte disorder ranges from 20 to 61% [1-3] and a potential relationship between low magnesium levels and increased mortality has been suggested in the literature [4].

Aim and Objective

To study serum magnesium level in critically ill patients compared to healthy controls. To predict the correlation of magnesium level with patient's prognosis and outcome.

MATERIALS AND METHODS

Study is conducted in sree balaji medical college during febraury 2014 – june 2014. It includes a total of 100 patients, of which 50 are patients from medical intensive care unit and 50 are healthy controls. Serum magnesium level is estimated using colorimetric method in a fully automated analyzer.

RESULTS

Serum magnesium levels was found to be low in critically ill patients(1.8 ±0.3 mmol/l) compared to healthy controls(2.2 ±0.2 mmol/l). The p value was < 0.05, which is significant.

Table 1: Significant reduction of serum magnesium in critically ill patients is seen compared with healthy controls.

	CRITICALLY ILL PATIENTS	CONTROLS
No of cases	50	50
Serum magnesium levels (mean)	1.4 ± 0.3 mg/dl	2.2 ± 0.3mg/dl

Table 2: In critically ill patients with low magnesium levels, prolonged ICU stay and increased mortality rate is observed. This proves hypomagnesemia may lead to adverse clinical outcome.

CRITICALLY ILL PATIENTS		
	LOW Mg levels	NORMAL Mg levels
ICU stay (days)	6	4
Mortality rate	8 %	2 %

DISCUSSION

Magnesium is essential for various enzyme activation involved in glucose metabolism, fatty acid synthesis, vital for nucleic acid and protein synthesis. Magnesium is a co-enzyme for calcium ATP as and proton pump, so its alteration effect membrane potential and gradient explaining its role in skeletal and cardiac muscle function. In normal situations the kidney and the small intestine control magnesium excretion and its reabsorption, respectively, and serum levels are maintained within a normal range [8].In hypomagnesemic patients in ICU set up with morbidity such as cardiac arrhythmias, respiratory muscle weakness and seizures [4], the most notifyable finding is that an imbalance of this electrolyte is significantly associated with increased mortality [1,4]. Various studies have reported the incidence of hypomagnesemia up to 65% in critically ill-patients [12]. There are multiple reasons for magnesium deficiency in critical care settings e.g., decreased absorption caused by impaired gastrointestinal activity, malnutrition, renal wasting of various drugs (e.g., digoxin, gentamicin, loop diuretics etc.), diabetes mellitus, hypokalemia and hypocalcemia [11]. Therefore, understanding the causes of hypomagnesemia may be important to define and improve patient prognosis. During surgery, magnesium loss has been ascribed to administration of magnesium-free fluids and

to serum catecholamine levels [5,6]. In fact, after hip surgery magnesium concentrations not only decreased significantly, but also led to worsening of cardiac arrhythmia [7].

Magnesium homeostasis maintenance is highly dependent on dietary intake. various causes for magnesium deficiency include malnutrition, diarrhoea, emesis, drugs (diuretics, aminoglycosides). Aminoglycosides have been shown to cause reversible renal lesion that results in hypermagnesuria and hypomagnesemia [9]. Proton pump inhibitor associated hypomagnesemia is a rare, but potentially life-threatening side-effect that has emerged only in the era of mass use of these agents [10].

The possible mechanism for hypomagnesemia in critically ill could be due to alterations in intracellular- extracellular distribution which occurs in metabolic acidosis, hungry bone syndrome,exogenous glucose ,exogenous insulin administration.

CONCLUSION

Significant reduction of serum magnesium levels contributed to prolonged ICU stay, high mortality rate with poor prognosis. This study gives the impact and significance of serum magnesium monitoring in critical illness and its value for favorable outcome. But, the need for correction and benefit of magnesium supplement requires further study.

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